

lower die 50b of the die assembly and encapsulated with a resin encapsulant with the seal tape 21 attached to the lower surface of the lead frame.

The method of this embodiment is characterized in that the seal tape 21 is provided with a through hole 25 located under the die pad 51 and that the lower die 50b is provided with a suction hole 54 in a region facing the die pad 13. The through hole 25 of the seal tape 21 is larger in diameter than the suction hole 54 of the lower die 50b, thus facilitating the positioning control of the through hole 54 to be aligned with the suction hole 25. The suction hole 54 communicates with a vacuum pump, which absorbs the die pad 13 toward the suction hole 54, thereby forcing the die pad 13 into the seal tape 21 more strongly.

In accordance with the method of this embodiment for manufacturing a resin-molded semiconductor device, by providing the through hole 25 and the suction hole 54 for the seal tape 21 and the die assembly, respectively, the die pad 13 can be forced into the seal tape 21 more strongly. Accordingly, even a die pad 13 having a large area, to which the clamping force is hard to be satisfactorily transmitted through the die assembly, can be protruded from the resin encapsulant much higher.

The method of this embodiment is naturally applicable to any member to be protruded from the resin encapsulant other than the die pad.

Other Embodiments

In the foregoing embodiments, the electrode pads of the semiconductor chip and the signal-connecting leads are connected to each other with metal fine wires. However, the connection members of the present invention are not limited to the metal fine wires. For example, if necessary, a resin-molded semiconductor device may be formed by encapsulating a semiconductor chip, which has been flip-chip mounted on a substrate via bumps interposed therebetween, with a resin encapsulant.

Also, if a suction hole is provided for a die assembly to encapsulate the chip, lead frame and so on while absorbing the seal tape 21 with the vacuum pressure, formation of wrinkles on the seal tape can be suppressed and the back surface of the resin encapsulant can be flattened.

What is claimed is:

1. A method for manufacturing a resin-molded semiconductor device, comprising the steps of:

- a) preparing a lead frame, the lead frame including: an outer frame surrounding a region in which a semiconductor chip is mounted; a die pad for supporting the semiconductor chip thereon; support leads for connecting the die pad to the outer frame; and signal-connecting leads to be connected to the outer frame, the die pad being located below the signal-connecting leads;
- b) mounting the semiconductor chip, including electrode pads, onto the die pad;
- c) electrically connecting the electrode pads of the semiconductor chip to the signal-connecting leads with metal fine wires;
- d) attaching a seal tape to a die assembly while adhering the seal tape at least partially to the respective lower surfaces of the die pad and the signal-connecting leads of the lead frame;
- e) encapsulating the die pad, the semiconductor chip, the signal-connecting leads and the metal fine wires with a resin encapsulant; and
- f) removing the seal tape,

wherein the respective lower surfaces of the die pad and the signal-connecting leads are at least partially not

covered with the back surface of the resin encapsulant but exposed, and

wherein the lower surface of the exposed part of the die pad is located at a level lower than the lower surface of the exposed part of each said signal-connecting lead.

2. The method of claim 1, wherein in the step a), a metal plated layer is formed on the surface of the lead frame.

3. The method of claim 1, wherein in the step d), the thickness of the seal tape is adjusted at a predetermined value such that at least part of the respective lower surfaces of the die pad and the signal-connecting leads protrude from the back surface of the resin encapsulant to reach respective desired heights.

4. The method of claim 1, wherein clearance grooves are formed in respective regions of the die assembly to make protruding portions of the die pad and the signal-connecting leads enter the grooves, and

wherein in the step e), encapsulation is performed while making at least part of the respective lower surfaces of the die pad and the signal-connecting leads enter the clearance grooves, thereby adjusting the respective heights of the portions protruding from the back surface of the resin encapsulant.

5. A method for manufacturing a resin-molded semiconductor device, comprising the steps of:

- a) preparing a lead frame, the lead frame including: an outer frame surrounding a region in which a semiconductor chip is mounted; a die pad for supporting the semiconductor chip thereon; signal-connecting leads to be connected to the outer frame; and support leads interposed between the die pad and the signal-connecting leads;
- b) mounting the semiconductor chip, including electrode pads, onto the die pad;
- c) electrically connecting the electrode pads of the semiconductor chip to the signal-connecting leads with metal fine wires;
- d) attaching a seal tape to a die assembly while adhering the seal tape at least partially to the respective lower surfaces of the die pad and the signal-connecting leads of the lead frame;
- e) encapsulating the die pad, the semiconductor chip, the signal-connecting leads and the metal fine wires with a resin encapsulant;
- f) cutting off part of each said support lead; and
- g) removing the seal tape,

wherein the respective lower surfaces of the die pad and the signal-connecting leads are at least partially not covered with the back surface of the resin encapsulant but exposed.

6. A method for manufacturing a resin-molded semiconductor device, comprising the steps of:

- a) preparing a die assembly having a suction hole, a semiconductor chip and a peripheral member for the semiconductor chip;
- b) attaching a seal tape to between the peripheral member and the die assembly such that the seal tape adheres to part of a surface of the peripheral member;
- c) forming a hole in part of the seal tape adhered to the peripheral member;
- d) sucking part of the peripheral member through the suction hole of the die assembly and the hole of the tape;
- e) encapsulating the semiconductor chip and the peripheral member except for the part of the surface thereof in a resin encapsulant, with the seal tape adhered to the surface, and

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- f) removing the seal tape after the step e) has been performed,
 wherein after the step d) is finished, at least part of the surface of the peripheral member protrudes and is not covered with the resin encapsulant but exposed. 5
7. The method of claim 6, wherein in the step a), a lead frame having a die pad is prepared as the peripheral member of the semiconductor chip, and
 wherein the part of the surface of the peripheral member adhered to the tape in the step b) is the die pad of the lead frame. 10
8. A method for manufacturing a resin-molded semiconductor device, comprising the steps of:
- a) preparing a die assembly, a semiconductor chip and a peripheral member for the semiconductor chip;

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- b) attaching a seal tape to between the peripheral member and the die assembly such that the seal tape adheres to part of a surface of the peripheral member, the thickness of the seal tape being in the range from 10 μm to 150 μm ;
- c) encapsulating the semiconductor chip and the peripheral member except for at least the part of the surface thereof in a resin encapsulant, with the seal tape adhered to the surface, and
- d) removing the seal tape after the step c) has been performed,
 wherein after the step d) is finished, at least part of the surface of the peripheral member protrudes and is not covered with the resin encapsulant but exposed.

9. (Newly Added) A resin-molded semiconductor device comprising:

a semiconductor chip having electrode pads;

a die pad for supporting the semiconductor chip;

inner leads each including a recess formed therein so as to define a reduced

thickness portion;

connecting members for electrically connecting the electrode pads to the inner

leads; and

a resin for encapsulating the die pad, the semiconductor chip, the inner leads and

the connecting members,

wherein the resin is formed both in a space between the die pad and the inner

leads and in the recess; and

wherein the resin is not formed on a bottom surface of the inner leads nor a

bottom surface of the die pad.

10. (Newly added) The device of claim 9, wherein the resin seals the opposite side of the bottom surface of the inner leads.

11. (Newly added) The device of Claim 10, wherein the bottom surface of the inner leads are arranged in a same plane as the bottom surface of the die pad.

12. (Newly added) The device of Claim 11, wherein the inner leads include

a convex portion; and wherein the resin is not formed on a bottom surface of the convex portion.

13. (Newly added) The device of Claim 12, wherein the recess is formed by etching.

14. (Newly added) The device of Claim 12, wherein the opposite side of the bottom surface of the inner leads are flat.

15. (Newly added) The device of Claim 12, wherein a bottom surface of the die pad includes a recess formed therein.